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Multiwavelength temporal and spectral variability of the blazar OJ 287 during and after the 2015 December flare: A major accretion disc contribution

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Abstract

© 2018 The Author(s). We present a multiwavelength spectral and temporal analysis of the blazar OJ 287 during its recent activity between 2015 December and 2016 May, showing strong variability in the nearinfrared (NIR) to X-ray energies with detection at γ -ray energies as well. Most of the optical flux variations exhibit strong changes in polarization angle and degree. All the interband time lags are consistent with simultaneous emissions. Interestingly, on days with excellent data coverage in the NIR-UV bands, the spectral energy distributions (SEDs) show signatures of bumps in the visible-UV bands, never seen before in this source. The optical bump can be explained as accretion-disc emission associated with the primary black hole of mass ~1.8 × 1010M⊙ while the little bump feature in the optical-UV appears consistent with line emission. Further, the broad-band SEDs extracted during the first flare and during a quiescent period during this span show very different γ -ray spectra compared to previously observed flare or quiescent spectra. The probable thermal bump in the visible seems to have been clearly present since 2013 May, as found by examining all available NIR-optical observations, and favours the binary supermassive black hole model. The simultaneous multiwavelength variability and relatively weak γ -ray emission that shows a shift in the SED peak is consistent with γ -ray emission originating from inverse Compton scattering of photons from the line emission that apparently contributes to the little blue bump.

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Keywords

BL Lacertae objects: individual: OJ 287, Galaxies: active, Galaxies: jets, Gamma-rays: galaxies, Radiation mechanisms: non-thermal, X-rays: galaxies

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